

IN THE CLAIMS:

Claim 1 (original): An apparatus for reusing a slurry effluent containing agglomerations of abrasive grains which has been used in a polishing step in the manufacture of a semiconductor, comprising:

a crusher for crushing the agglomerations of abrasive grains contained in the slurry effluent; and

a regeneration unit for regenerating an abrasive fluid using the slurry effluent containing the crushed abrasive grains.

Claim 2 (original): The apparatus according to claim 1, wherein the crusher includes ~~at least one~~ of a mill, an ultrasonic oscillator and a pressurizing circulation unit, at least one of which is selectively used to crush the agglomerates.

Claim 3 (original): The apparatus according to claim 2, wherein the crusher includes an agitator for agitating the slurry effluent to cause the crushed abrasive grains to be dispersed in the slurry effluent.

Claim 4 (original): The apparatus according to claim 1, further comprising a concentrating unit for concentrating the slurry effluent processed by the crusher.

Claim 5 (original): The apparatus according to claim 4, wherein the concentrating unit includes a concentrating membrane for separating the slurry effluent into a concentrate fluid and a permeate fluid.

Claim 6 (original): The apparatus according to claim 5, wherein the concentrating unit includes a plurality of concentrating paths respectively having a plurality of concentrating membranes.

Claim 7 (original): The apparatus according to claim 5, wherein the concentrating unit includes:

a temperature regulator for adjusting the temperature of the slurry effluent; and  
a concentration controller for controlling the temperature regulator to control the concentration of the concentrate fluid.

Claim 8 (original): The apparatus according to claim 7, wherein the concentration controller includes a flow rate detecting unit for detecting the flow rate of the concentrate fluid and for controlling the temperature regulator based on the detected flow rate.

Claim 9 (original): The apparatus according to claim 7, wherein the concentration controller controls the temperature regulator so that the concentration of the concentrate fluid is substantially the same as the concentration of a fresh slurry fluid.

Claim 10 (original): The apparatus according to claim 5, further comprising a circulation channel provided between the concentrating unit and a polishing device, for providing the concentrate fluid as a regenerated slurry fluid from the concentrating unit to

the polishing device.

Claim 11 (original): The apparatus according to claim 4, further comprising fluid quality regulator provided between the crusher and the concentrating unit, for receiving the slurry effluent from the crusher and regulating the quality of the slurry effluent.

Claim 12 (original): The apparatus according to claim 11, wherein the fluid quality regulator includes a specific gravity adjusting unit for adjusting the concentration of abrasive grains in the slurry effluent.

Claim 13 (original): The apparatus according to claim 11, wherein the fluid quality regulator includes a pH adjusting unit for adjusting the pH of the slurry effluent.

Claim 14 (original): The apparatus according to claim 5, further comprising a filter unit provided downstream of the concentrating unit, for filtering the concentrate fluid.

Claim 15 (original): The apparatus according to claim 14, wherein the filter unit includes a plurality of filtering paths respectively having a plurality of filters.

Claim 16 (original): The apparatus according to claim 5, further comprising:  
a chamber provided downstream of the concentrating unit, for temporarily storing

the permeate fluid; and

a back washing unit for cleansing the concentrating membrane using the permeate fluid stored in the chamber.

Claim 17 (original): The apparatus according to claim 16, wherein the back washing unit includes a gas purger for purging a gas into the chamber, and wherein the gas is an inert gas which prevents oxidation of the permeate fluid.

Claim 18 (original): The apparatus according to claim 16, wherein the concentrating unit includes a plurality of concentrating paths respectively having a plurality of concentrating membranes, and the chamber and the back washing unit are provided to correspond to the plurality of concentrating membranes.

Claim 19 (original): The apparatus according to claim 5, further comprising a slurry feeder for receiving the permeate fluid from the concentrating unit and preparing a regenerated slurry fluid using the permeate fluid.

Claim 20 (currently amended): A crusher for crushing agglomerations of abrasive grains contained in a slurry effluent which has been used in the manufacture of a semiconductor comprising:

a tank for storing the slurry effluent; and

~~at least one of~~ attached to the tank, a mill, an ultrasonic oscillator and a pressurizing circulation unit, at least one of which is selectively used to crush agglomerates attached to the tank.

Claim 21 (original): The crusher according to claim 20, further comprising an agitator attached to the tank, for agitating the slurry effluent to cause the crushed abrasive grains to be dispersed in the slurry effluent.

Claim 22 (withdrawn): An apparatus for concentrating a slurry effluent, comprising:  
a concentrating unit including a concentrating membrane for separating the slurry effluent into a concentrate fluid and a permeate fluid;  
a temperature regulator for adjusting the temperature of the slurry effluent; and  
a concentration controller for controlling the temperature regulator to control the concentration of the concentrate fluid.

Claim 23 (withdrawn): The apparatus according to claim 22, wherein the concentration controller includes a flow rate detecting unit for detecting the flow rate of the concentrate fluid and for controlling the temperature regulator based on the detected flow rate.

Claim 24 (withdrawn): An apparatus for regulating the quality of a slurry effluent

including abrasive grains, comprising:

a tank for storing the slurry effluent; and

a specific gravity adjusting unit for adjusting the concentration of the abrasive grains in the slurry effluent.

Claim 25 (withdrawn): An apparatus for regulating the quality of a slurry effluent including abrasive grains, comprising:

a tank for storing the slurry effluent; and

a pH adjusting unit for adjusting the pH of the slurry effluent.

Claim 26 (withdrawn): An apparatus for cleansing a concentrating membrane used in a concentrating a slurry effluent, a concentrate fluid and a permeate fluid generated by concentrating the slurry effluent, the apparatus comprising:

a chamber for temporarily storing the permeate fluid; and

a back washing unit for cleansing the concentrating membrane using the permeate fluid stored in the chamber.

Claim 27 (withdrawn): The apparatus according to claim 26, wherein the back washing unit includes a gas purger for purging a gas into the chamber, and wherein the gas is an inert gas which prevents oxidation of the permeate fluid.

Claim 28 (withdrawn): The apparatus according to claim 26, wherein the concentrating membrane includes a plurality of concentrating membranes, and the chamber and the back washing unit are provided to correspond to the plurality of concentrating membranes.

Claim 29 (withdrawn): A method of reuse of a slurry effluent containing agglomerations of abrasive grains which has been used in a polishing step in the manufacture of a semiconductor, comprising the steps of:

crushing the agglomerations of abrasive grains contained in the slurry effluent using at least one process selected from the group consisting of a mill process and an ultrasonic oscillation process; and

regenerating an abrasive fluid using the slurry effluent containing the crushed abrasive grains.

Claim 30 (withdrawn): The method according to claim 29, wherein the crushing step includes agitating the slurry effluent to cause the crushed abrasive grains to be dispersed in the slurry effluent.

Claim 31 (withdrawn): The method according to claim 29, further comprising the step of concentrating the slurry effluent subsequent to the crushing step.

Claim 32 (withdrawn): The method according to claim 31, further comprising the step of regulating the quality of the slurry effluent between the crushing step and the concentrating step.

Claim 33 (withdrawn): The method according to claim 32, wherein the quality regulating step includes adjusting the concentration of abrasive grains in the slurry effluent.

Claim 34 (withdrawn): The method according to claim 33, wherein the quality regulating step includes adjusting the pH of the slurry effluent.

Claim 35 (withdrawn): The method according to claim 31, wherein the concentrating step includes separating the slurry effluent into a concentrate fluid and a permeate fluid using a concentrating membrane.

Claim 36 (withdrawn): The method according to claim 35, wherein the concentrating step includes controlling the concentration of the concentrate fluid by adjusting the temperature of the slurry effluent.

Claim 37 (withdrawn): The method according to claim 35, wherein the concentration of the concentrate fluid is controlled to be substantially the same as the concentration of



a fresh slurry fluid.

Claim 38 (withdrawn): The method according to claim 35, wherein the concentrating step is performed using a plurality of concentrating membranes disposed in a plurality of concentrating paths.

Claim 39 (withdrawn): The method according to claim 38, further comprising the step of cleansing a plurality of concentrating membranes in a time offset manner using the permeate fluid.

Claim 40 (withdrawn): The method according to claim 35, further comprising the step of cleansing the concentrating membrane using the permeate fluid.

Claim 41 (withdrawn): The method according to claim 40, wherein the cleansing step includes purging a gas into a storage chamber which temporarily stores the permeate fluid to cause the permeate fluid to be ejected toward the concentrating membrane, and wherein the gas is an inert gas which prevents oxidation of the permeate fluid.

Serial No.: 10/675,939  
OA dated June 17, 2005  
Resp dated July 18, 2005

Claim 42 (withdrawn): The method according to claim 35, further comprising the step of filtering the concentrate fluid.